ParCoat® Coatings

For Smooth Installation of Seals

Parker Prädifa

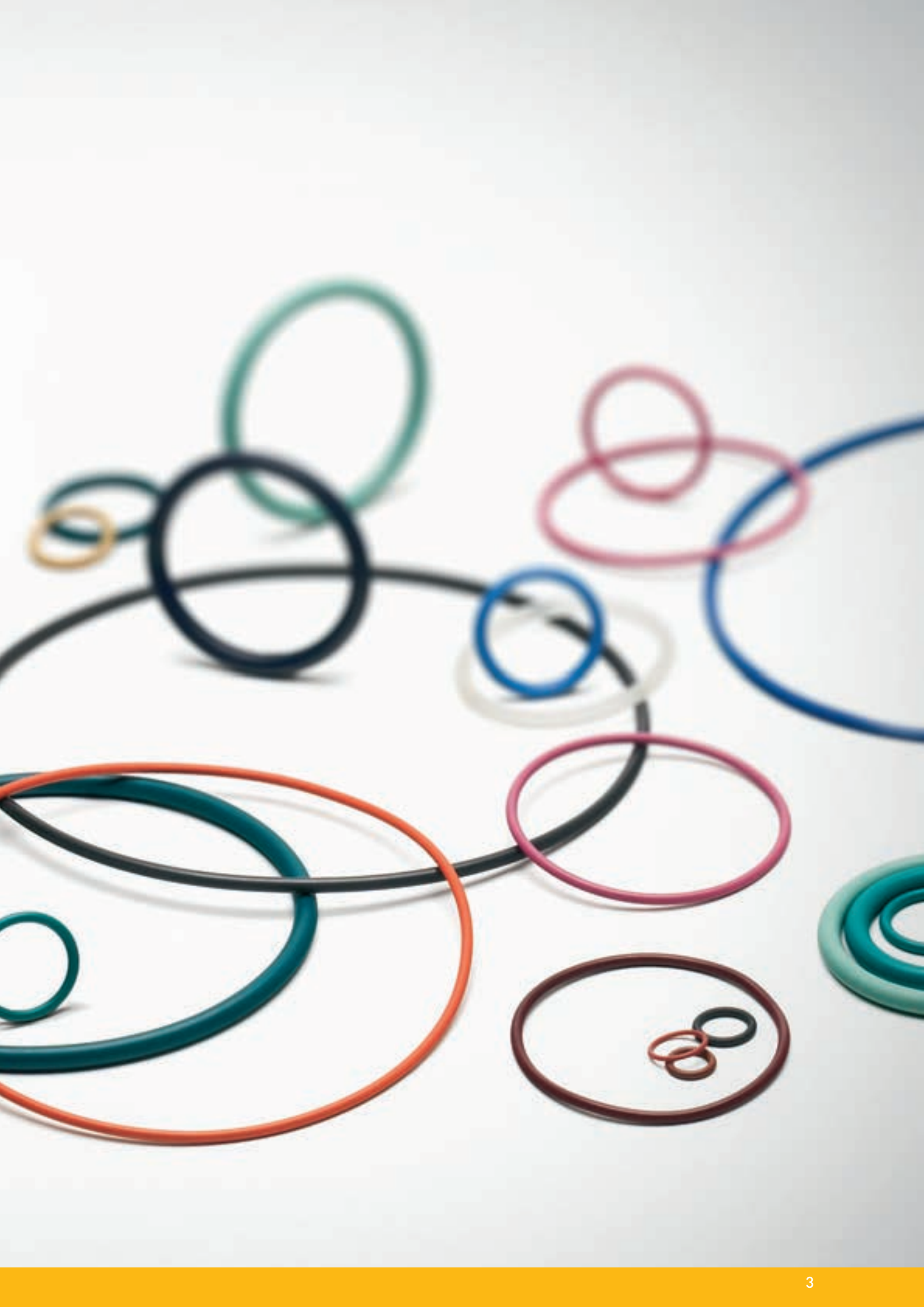
ENGINEERING YOUR SUCCESS.

Reliable Installation with ParCoat®

ParCoat® coatings from Parker Prädifa were developed specifically for elastomer products. They avoid mistakes during the installation of seals and thus ensure reliable and long-lasting seal performance.

Seals have to meet exacting requirements because seal failure may lead to failure of the whole system. However, in many cases the failure of a sealing system is not the result of manufacturing defects of the sealing elements but caused by mistakes during their installation, such as damage or mix-ups. The consequences are particularly serious because errors are hard to detect after the seal has been installed and will thus go unnoticed until the sealing system fails.

Consequently, in addition to the right selection, design and quality of the sealing system, it is important to minimize the risk of faulty installation.



Three Challenges – One Solution

The installation of seals entails a number of risks that Parker Prädifa with a proven track record of specializing in materials, sealing and coating technologies systematically prevents with ParCoat® or at least significantly reduces. These risks extend from mix-ups to high assembly forces through to seal stacking in high-volume manufacturing.

Mix-up

O-rings, like many other sealing elements, often look very similar in terms of shape and color and are thus difficult to distinguish from each other externally. These similarities may lead to problems when an assembly situation involves several sealing elements with diverse technical properties.
This poses the risk of mix-ups, which may result in subsequent functional failure.

Solution with ParCoat®
ParCoat® coatings are available as colored versions. As a result, ParCoat® coatings in different colors make it possible to clearly distinguish elastomeric components with similar geometries and colors (e.g. in the case of black rubber compounds) from each other, which significantly reduces the risk of mix-ups.

Stacking

In high-volume manufacturing, smaller parts including seals are frequently supplied as bulk material that is separated and fed to the machines by conveyor systems. Due to their surface properties, elastomeric sealing elements are prone to stick together. The resulting stacking of sealing elements may lead to trouble including line standstill.

Solution with ParCoat®
Unlike elastomeric components lubricated with greases or oils, those using ParCoat® remain dry and require no additional lubrication for assembly. This facilitates the separation of seals in automatic feeder systems and minimizes the risk of dirt sticking to moist surfaces. In addition, the coating prevents components from sticking together during storage or of packaged seals during shipping.

Mechanical Loads

Both manual and fully automatic seal assembly frequently involves high (friction) forces. During installation, seals slide across surfaces and are stretched or compressed in the process. Due to high friction forces or strong adhesion to the surfaces of the assembly fixtures or the groove, high mechanical loads may act on the sealing elements, which may lead to severe – sometimes permanent – deformation such as twisting or excessive mechanical stress that results in cracks. As this type of damage is hard to detect after installation, and will thus frequently go unnoticed, it is particularly serious and poses an increased risk of total system failure.

However, high friction forces during assembly may not only damage the O-ring, but also make its installation clearly more difficult or even prevent it. This is the case when the assembly forces rise to levels where the installation equipment, due to inadequate or highly fluctuating assembly forces, is no longer able to effectively position the sealing elements. This results in downtimes that prevent cost-efficient, trouble-free assembly.

Solution with ParCoat®
With ParCoat® coatings, which are only a few micrometers thick and significantly reduce friction, the tribological properties of seals can be modified in a way that allows them to be installed with clearly less force and thus less stress acting on the component. While the elasticity and chemical resistance of the elastomeric components are not negatively affected the risk of excessive stress during assembly is clearly reduced. The relatively low additional costs of a ParCoat® coating bear no relation to the typical costs that may be incurred due to installation damage that is either detected too late or not at all.

Systematic Modification of Surfaces

ParCoat® coatings are able to systematically modify and optimize surfaces. The friction behavior and adhesion tendency of sealing materials can be influenced favorably. Colored coatings serve to mark products and to avoid mix-ups.

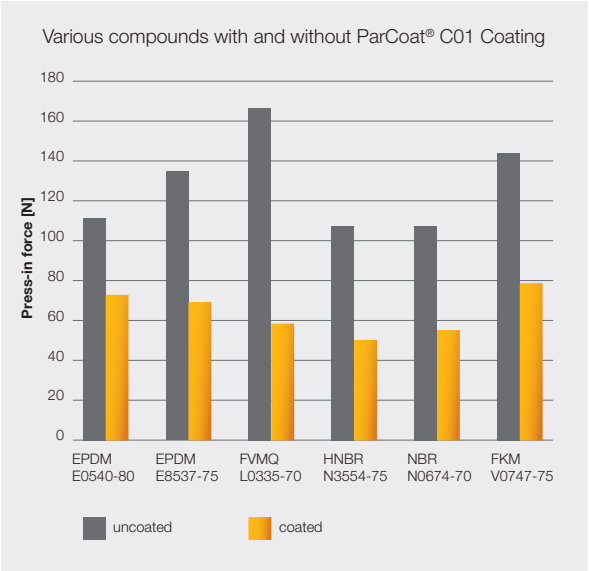
Color Coding

Color may be used as a recognition feature, for instance when the seal is coated in the customer's color for corporate identity purposes or serves as an application-specific color code to avoid mix-ups. Particularly in low-volume production or special series where in most cases the development of a respectively colored compound is not economically feasible ParCoat® coatings are an easy and cost-effective way to provide elastomeric components with the desired color.
If the basic compound itself is colored then the coating in many cases must not change this color. For these applications, transparent ParCoat® coatings are the right choice.

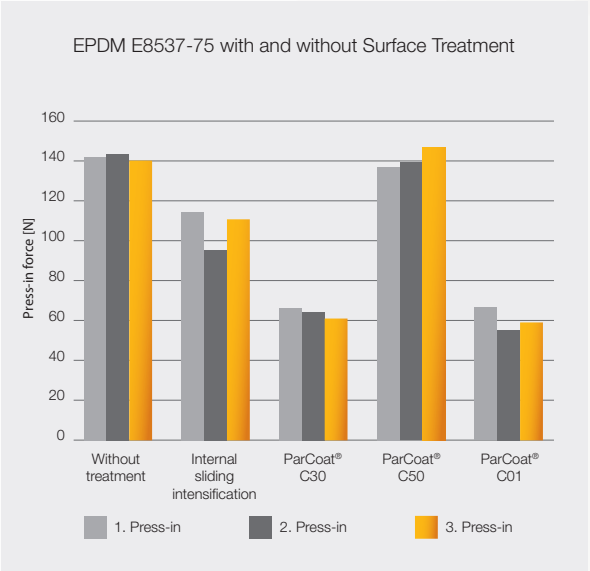
Easier Installation

Example: press-in assembly forces in connectors (O-Ring 11 x 2,5 mm)

Depending on the application, the utilization of ParCoat® C01 may reduce assembly forces by 50 % and more compared to uncoated O-rings or O-rings with other surface finishes.



Press-in forces required for installation of standard connectors on automotive air conditioning systems with ParCoat® C01-coated and uncoated O-rings.



Even when the same O-ring is repeatedly installed, the assembly forces remain at a consistently low level.

ParCoat® at a Glance

- Suitable for all commonly used elastomer grades
- Clearly reduced assembly forces
- Prevention of assembly damage
- Fast, cost-effective installation
- Reliable and effective separation, depositing and feeding
- Anti-stacking properties
- Realization of color coding and corporate identity
- Transparent coatings for colored base compounds available as well

In-Process Know-how

When finishing seals with ParCoat® coatings, it is crucial to achieve optimal bonding between the coating and the elastomeric base material. As a materials and coating specialist, Parker Prädifa masters the finishing process with equal reliability as the entire seal production process. The utilization of special techniques, depending on the specific requirements, ensures excellent product quality.

Cleaning

Impurities and dirt that could have an adverse effect on the coating result are removed from the surface of the elastomeric products.

Possible Methods

- Ultrasound
- Ionized air
- Washing equipment
- High-pressure cleaning

Surface Activation

Specific modification of the surface properties to enhance the bonding between the coating and the seal, for instance by means of plasma treatment.

Coating

Essentially, two techniques may be used, depending on production volume, dimensions and type of coating:

Drum Method
For large production volumes of small symmetric articles

- Spraying of the coating into a rotating drum in which the elastomeric components are in continuous motion
- Homogeneous and even coating

Spray Coating Method
For large, asymmetric geometries or partial coating.
For low-volume production.

- Spraying of single parts across the surface
- Comparatively longer cycle time

Technical Prerequisites

A clean surface without paint wetting impairment substances (e.g. greases, oils, release agents) is indispensable to good adhesion between the elastomeric component and the coating.

Objectives

Essentially, any coating process pursues the objective of achieving effective bonding between the coating and the elastomeric base material. The coating should adhere well to the surface of the seal and be equally elastic as the elastomeric component itself. Separation or cracking of the coating in the event of deformation – e.g. during installation – must be excluded.

Methods

The application of ParCoat® coatings typically involves several process steps. However, not all process steps are required for all types of coatings.

Inspection

of the coating quality, depending on the requirement:

- Inspection of the friction-reducing properties by measuring the assembly forces in testing equipment that corresponds to the subsequent assembly conditions
- Bending tests to check elasticity
- Verification of the homogeneity of the coating using optical inspection technology. For this purpose, fluorescent chemicals are added to the coatings. Exposure to UV light can then make the coating visible for an optical quality check.

Packaging

The ParCoat®-finished product is packaged and labeled.

Versatile Applications

Automotive Engineering

- Air conditioning lines
- Quick couplings for fuel systems
- Sensors, electrical connections
- And more

Industrial Applications

- Valves
- Connectors
- Measurement equipment
- Fittings
- And more

ParCoat®	Description	Primary Application Requirement					Visual Appearance
		Feeding/ separation	Reduction of assembly forces	Multiple installation/ durability	Elasticity	Cleanliness	
C01	Elastomer resin	●●●	●●●	●	●●●	●●●	dry coating
C03	Elastomer resin	●●●	●●●	●	●●●	●●●	dry coating
C02	Molykote MOS_2	●	●		●●●		powder coating
C04	Talcum	●●	●		●●●		powder coating
C06	Graphite powder	●	●		●●●		powder coating
C15	Lubricant polymer	●●●	●●	●●	●●	●●●	dry coating
C30	Silicone lubricant varnish	●●●	●●●	●●	●●	●●●	dry coating
C31	Silicone lubricant varnish	●●●	●●●	●●	●●	●●●	dry coating
C70	Polysiloxane lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C50	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C52	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C55	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C58	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C59	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C73	PTFE lubricant varnish	●●●	●●	●	●●	●●●	dry coating
C53	Plasma polymerization	●●	●●	●●●	●	●●●	dry coating
C74	Fluorination	●●	●	●●●	●●●	●●●	surface modification

● moderately suitable ●● suitable ●●● very suitable

Operating Temperatures (°C)	Color	UV Indicator	PWIS-free	Approvals	Suitable Base Materials									
					NBR	HNBR	EPDM	FKM	FFKM	IIR	ACM	AEM	FVMQ	TPU
-40 to 200	transparent	optional	-	-	x	x	x	x	x	x	x	x	(x)	(x)
-40 to 100/120	transparent	optional	-	KTW, WRAS	x	x	x	x	x	x	x	x	(x)	(x)
like base material	silver	no	-	-	x	x	x	x	x	x	x	x		
like base material	white	no	-	-	x	x	x	x	x	x	x	x		
like base material	black	no	-	-	x	x	x	x	x	x	x	x		
-40 to 85	translucent	no	-	-	x	x	x	x	x	x	x	x		x
-30 to 200	black	no	yes	-	x	x	x	x	x					
-30 to 200	transparent	no	yes	-	x	x	x	x	x					
-70 to 180	transparent	no	-	-	x	x	x	x	x		x	x		(x)
-40 to 150	transparent	no	-	FDA	x	x	x	x	x	x	x	x	(x)	(x)
-40 to 150	dark blue	optional	-	-	x	x	x	x	x	x	x	x	(x)	
-40 to 150	red	optional	-	-	x	x	x	x	x	x	x	x	(x)	
-40 to 150	green	optional	-	-	x	x	x	x	x	x	x	x	(x)	
-40 to 150	yellow	optional	-	-	x	x	x	x	x	x	x	x	(x)	
-40 to 150	orange	optional	-	-	x	x	x	x	x	x	x	x	(x)	
like base material	like base material	no	-	-	x	x	x	x	x	x	x	x		x
like base material	like base material	no	yes	-	x	x	x	x	x	x	x	x		

(x) = after testing

WARNING: These products can expose you to chemicals including carbon black (airborne and extracts), antimony trioxide, titanium dioxide, silica (crystalline), di(2-ethylhexyl)phthalate, ethylene thiourea, acrylonitrile, 1,3-butadiene, epichlorohydrin, toluenediisocyanate, tetrafluoroethylene, ethylbenzene, formaldehyde, furfuryl alcohol, glass fibers, methyl isobutyl ketone, nickel (metallic and compounds), lead and lead compounds which are known to the State of California to cause cancer; and 1,3-butadiene, epichlorohydrin, di(2-ethylhexyl)phthalate, di-isodecyl phthalate, ethylene thiourea, methyl isobutyl ketone, methanol, toluene, lead and lead compounds which are known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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